CAP COM Roger. Frank, do you think you are going to be able to do this burn radially. We would like to add to its magnitude if you are going to make it in some other direction. Over.

SC No, I am not even sure we are going to do it yet, Mike. If I can get - if we seem to be drifting away from this thing a little bit, although it is still pointing at us quite closer than I like.

CAP COM Roger. Understand.

CAP COM Apollo 8. Houston. We would like you to do some additional maneuvers. It is just a question of how much and which direction.

SC Okay, our gimbal angles are about 190 and pitch is about 320 and yaw is about oh, 340. We could certainly do it in this position. That would be alright.

CAP COM Stand by. We will check those.

CAP COM Apollo 8. Houston. Frank, you could help us out if you would explain where you are relative to the booster. In other words, with respect to the earth and the radius back there. Are you above or below or one side or where exactly is the booster relative to you?

SC Well, it's as I said before. We can't definitely find the earth. I think we are in front and a little bit above - a little bit above the - almost in front of the - directly in the front of the booster.

CAP COM Roger. Understand. Almost directly in front of the booster.

SC Perhaps a little bit horizontally displaced towards the - let's see - Houston, to help you, we are looking right directly above the S-IVB with the sun - it's on the right side of the S-IVB and on our left number one window.

CAP COM Okay, understand. The sun is on the right side of the S-IVB and coming in your number one window. And are you - when you give us those angles, that means that your +X-axis is pointed at it with those angles. Is that affirm?

SC Roger.

CAP COM Okay.

SC The earth is in our +Y, +Z-direction now Mike.

SC Roger. And a little minus X.

CAP COM That's okay.

SC Houston. For information, I am looking through the scanning telescope now and I see millions of stars. Most of them - the venting of the S-IVB.

CAP COM Right. Are you having trouble telling which are the stars and which are the S-IVB particles?

SC We are in sunlight and it looks like they are all S-IVB. We don't know. I am going to attempt a B-52 realign at this time and see what I can do.

CAP COM Understand you.

SC Mike, anything more on separation maneuver you're on?

CAP COM We are working on it. Frank, we are are trying to compute what radially outward will be in close terms. Now, you still have the earth - as I understand plus Y and plus Z quadrant. In other words, it's down below you on your right and slightly to your rear? Is that still true?

SC That's right. Quite a bit to our rear and down below us. Copied right.

CAP COM Okay, well, we - of course, in that attitude you want to burn some upward and some to the left and we are trying to be more precise than that. Frank, is it still about the same distance away? Are you opening or closing?

SC It sure is staying close.

CAP COM Understand.

SC Mike, can you just tell us which way the S-IVB pitchs and how far it will pitch to the sling shot maneuver attitude.

CAP COM Stand by. Frank, the S-IVB is within 10 degrees of its final attitude at this time.

SC Houston. Are you ready to copy the IMU align information?

CAP COM Go ahead.

SC Star ID is 03, and star 36, star angle difference point 01. Torquing angle X minus 00034, Y minus 0027, Z plus 00100. Over.

CAP Okay, thank you for Y, I just got four digits here. 0027.

SC Three zero's. 00027.

CAP COM Thank you.

SC Houston. We are going to have to hold up on this lunar navigation until after this next little maneuver.

CAP COM Roger. Jim. We understand. (Pause) Apollo 8, Houston.

SC Go ahead now, Mike.

CAP COM Can you give us an updated readout in your gimbal angle. What your plus X-axis is pointed toward the booster, please.

SC Roger. Stand by.
CAP COM Apollo 8. Houston.
SC Go ahead, Houston.
CAP COM Did you give us those gimbal angles, Frank, when you have a chance?

END OF TAPE

CAPCOM Apollo 8, Houston.
SC Go ahead, Houston.
CAPCOM Could you give us gimbal angles when you get a chance?
SC I'm getting the COAX on it right now so it will be accurate.
CAPCOM Thank you.
SC Okay, with the COAX right on the S-IVB, the roll reads 105, the pitch is 275, and the yaw is about 325.
CAPCOM Roger. Copy roll 105, pitch 275 and yaw 325.
SC Roger. That should be 115 for the roll.
CAPCOM Thank you. 115 for the roll.
SC Houston, Apollo 8, over.
CAPCOM Apollo 8, Houston, go ahead.
SC Roger. If it will help you any, Mike, the earth is +Y about 45 degrees in a -X, I can see it out my side window and it's a beautiful view with numerous cloud vortex.
CAPCOM Thank you, Bill, thank you. Understand +X 45 degrees halfway between +Y and +Z and slightly -X.
SC Negative. It's 45 degrees in the +Y, in the X-Y plane towards -X, over.
CAPCOM Roger. Understand the X-Y plane, toward X 45 degrees.
SC 45 degrees from +Y to -X.
CAPCOM Roger, thank you.
SC It's behind us to the right, if that will help.
SC I can still see the Cape and glimpses of Central America.
CAPCOM Roger, understand, Frank, what we want on this burn is 8 feet per second, 8 feet per second. We want it radially upward and we want you to use whatever thrusters are required to burn radially upward at 8 feet per second.
SC Why do you want to use - why do you want to do so much, Mike?
CAPCOM Because of the separation distance we would like to achieve between now and the time of S-IVB blowdown.
SC Okay. Mike, do you want me to go ahead and try to do this, or do you want to give me some gimbal angles.
CAPCOM Apollo 8, Houston. Go ahead and do it without gimbal angles if you can do that. Over.

SC Okay. I don't understand why you want so many feet per second on it, but I think I can - with just a little maneuvering I can get away from it a lot simpler than that.

CAPCOM Well, we would like the radial upward for trajectory reasons and the magnitude because of the separation distance which we're predicting you will have at S-IVB blowdown.

SC Okay. VHF sounds good.

CAPCOM Roger, on the VHF.

SC Omni B.

CAPCOM Understand Omni B, Baker.

CAPCOM Apollo 8, Houston.

SC Go ahead, Houston, Apollo 8.

CAPCOM Roger. About 12 minutes before your big blowdown, there is a small continuous vent which opens at a GET of 45555. You may notice that on the booster, 12 or 15 pound thrust.

SC Okay.

CAPCOM And Apollo 8, could you give us your burn information whenever you have it?

SC Roger. We are maneuvering to the attitude now.

CAPCOM Okay.

SC Okay, Houston. I understand you want 8 feet per second burn, is that right?

CAPCOM Roger. 8 feet per second, radially upward.

SC Well, we are as close to being radially upward as we can determine.

CAPCOM Roger.

CAPCOM Apollo 8, Houston. Are you going to use P-47 to monitor the burn?

SC Yes. We are putting it in right now.

CAPCOM Thank you.

SC Maneuvering now.

CAPCOM Thank you.

SC Houston, we made the burn at 7.7 +X + 0001 Y and Z's are all zeros. Gimbal angles, roll 180, pitch 310, and yaw 020.

CAPCOM Roger. I copy +X, 7.7, Y 0.1 and roll, pitch and yaw 180, 310, and 20.

SC Did you get that information, Houston?

CAPCOM Apollo 8, Houston. How do you read me?

SC Read you loud and clear. Did you get the information?

CAPCOM I say again, we copied +X 7.7, 1/10th in

Y, no Z, roll, pitch, and yaw, 180, 310, and 020.

SC Roger. The burn was made at - initiated at 445.

CAPCOM Roger, copy 445 .

SC Okay. Do you want us to transfer that to CM - LM state vector or just leave it alone? You -

CAPCOM - the primary, Frank, we would like you to transfer from the CSM to the LM state vector.

PAO And this is Apollo Control. That brings us up to the live action at 4 hours 49 minutes into the flight. You heard Jim Lovell say we would have to postpone his navigation - cislunar navigation task which involved plotting several stars, which had been planned during this last one-half hour and its place went the separation maneuver, an 8 foot per second separation maneuver to insure adequate separation from the S-IVB. In the course of the last half hour, we lost, the ground lost lock with beacon on the S-IVB. That was a VHF beacon. Our present altitude, their distance from earth is 17,200 miles and they are still hearing VHF, which is being piped music via VHF out of the Goldstone, California, station. Now we are asking them again about the booster. Let's listen.

SC - and we must be out a thousand feet and moving out.

CAPCOM Roger. Understand 90 degrees from its X-axis and about 1000 feet and separating.

SC Plus or minus a couple of thousand.

CAPCOM Understand.

PAO Apollo Control here. As we started to say, the distance from earth, 17,400 miles. Our velocity now has slowed in relation to the earth down to 14,384 feet per second and constantly slowing. We just heard from the command pilot and he says they will resume the flight plan now with their navigation tasks. At 4 hours and 52 minutes into the flight, this is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston 5 hours 3 minutes into the flight. The spacecraft is 18 nearly 19 000 miles from earth nearing the synchronous point, which it will just start on through, of course. Velocity continues to slow, it's now 13 860 feet per second. In the last 10 minutes we had another beautiful view type statement from the crew. We heard from both Lovell and Frank Borman, and the view indeed must be extraordinary. They described the cloud cover over Africa, over all of South America, and the effects over much of North America. Frank Borman issued a special little weather warning. He suggested the people in Tierra del Fuego area at the tip of South America better get their rain coats out. Here is the tape of that conversation.

SC Houston, Apollo 8 with a BRD reading.

CAPCOM Go ahead.

SC Roger. At 4 hours 4 minutes Commander is 0, CMP .64, LMP .02.

CAPCOM Got that, copy left to right: 0, .64 and .02 at 4 hours and 4 minutes. Thank you.

SC Roger. At 4 53 it was .01, 064, .03, and negligible on the survey meter.

CAPCOM Roger, thank you.

SC I have a beautiful view of the S-IVB and the earth here on one. I'll try and get a picture for you.

CAPCOM Okay.

CAPCOM Apollo 8 Houston. We've got you about a minute away from the continuous vent open, and 14 minutes away from the big dump, and and we would like an estimate on your distance now per unit.

SC Standby. Our distance is about 3000 feet we would estimate.

CAPCOM Thank you.

SC And we can see the vent.

CAPCOM Apollo 8 Houston. Say again.

SC We can see the vent.

CAPCOM Thank you.

SC Houston, Apollo 8.

CAPCOM Go ahead, Jim.

SC Boy, it's really hard to describe what this earth looks like. I'm looking out my center window, which is the round window, and the window is bigger than the earth is right now. I can clearly see the terminator. I can see most of South America all the way up to Central America, Yucatan, and the Peninsula of Florida. There is a big swirling motion just off the east coast, and then going on over toward the east I can still see West Africa, which has a few clouds right now. We can see all the way down to Cape Horn in South America.

CAPCOM Good grief, that must be quite a view.

SC Yes. Tell the people in Sierra del Fueago to put on their rain coats. Looks like a storm is out there.

CAPCOM Roger, will do. Do you care to give them a 24 hour forcast?

SC Might be as good as any other.

SC Houston, Apollo 8.

CAPCOM Apollo 8 Houston. Go ahead.

SC You might be interested to know the center window is pretty well fogged up, but the other seems to be in pretty good shape.

CAPCOM Glad to hear you've got 4 out of 5, and your big dump will be coming up in 2 minutes.

SC Roger, we're standing by.

SC The S-IVB has started dump.

SC Houston, Apollo 8.

CAPCOM Go ahead Apollo 8.

SC Roger. Mike did you say star 14?

CAPCOM Yes. Standby while I give you that time again. Star number 14 should be good for about another 8 minutes, Jim. 7 minutes.

SC Okay, now be advised on this calibration it is very difficult to do because of all the other little stars floating around here. Might do a (garbled) bypass it and do it at the end.

CAPCOM Roger, Apollo 8, understand.

CAPCOM You should have the rockets out now, Apollo 8.

SC Houston this is 8. I'm looking through the scanning telescope on the LOX and I'm just blanked out completely (garbled)

CAPCOM Understand.

SC It's a fantastic sight. Looks the S-IVB has (garbled)

CAPCOM Roger, understand.

PAO Apollo Control here. And we are 5 hours 9 minutes into the flight and we, as you heard the crew record, the S-IVB is doing it's propulsive vent and now we should see pretty dramatic separation between the two vehicles. The S-IVB will remain on a path which will take it, essentially, if you consider the moon straight ahead of your for analogy purposes, it will take the S-IVB to the right of the moon while the spacecraft will veer into the left and slightly ahead of the moon. Earlier in that conversation you heard Anders reporting his PRD reading and it's the personal radiation Dosemeter, and perhaps another Dosemeter and they were down on the negligible range as we anticipated they would be. Although the crew at this point has passed through the thickest portion of the Van Allen Radiation Belt as it departs the earth. It will continue to go through some

END OF TAPE

PAO This is Apollo Control Houston, 5 hours, 33 minutes into the flight. We are now 22 500 miles from Earth, our velocity 12 700 feet per second. In the course of his recent remarks, Jim Lovell said that he had alot of difficulty in finding the proper stars, various star checks from, because of the competition of the S-IVB venting. Apparently that is setting off big splashes of light, which drown out the stars; however, they should be seperating at the last reading they were 3000 feet from the S-IVB, and that distance should be growing. The crew has just advised that they can no longer hear the music we have been piping to them by VHF out of California. At the last report, they were getting our 18 - 19 000 miles. We just cleared them and they said they were not hearing it. We got quite alot of tape backed up, we'll play it for you now.

CAPCOM Apollo 8, Houston.

SC Standby.

SC Ready to copy.

CAPCOM Okay, we are about 510 BT, where we will record the block data TLI plus 4 and TLI plus 11. The TLI plus 4 pad that we gave you before is perfectly alright, we will not require that one and we will have the TLI plus 11 out for you shortly. Then at 545 or 6 hours on that high gain antenna check-out. Roger, standing by.

SC We are on OMNI B and we heard, we lost you after TLI plus 4 was okay.

CAPCOM Okay, the TLI plus 4 hour pad is okay, we will have the TLI plus 11 hour pad for you shortly and at 550 for your high gain antenna check-out, we would like you to leave that switch in wide beam with reference to our conversation the other day, leave it wide.

SC Roger, don't want to zap your receivers.

CAPCOM No, it has to do with some loss of tracking data, so it is better to leave it blank.

SC Okay.

SC Houston, Apollo 8. Are you recording what we are getting out of 23?

CAPCOM Standby 1 minute and I'll check.

CAPCOM That is affirmative, Jim, we are copying your P23.

SC Pretty big numbers there.

CAPCOM Well, we think that is because you bypassed the trunion test.

SC Roger. Houston, we are really getting some big numbers (garble).

CAPCOM Right, understand, Jim.

SC Do you want us to proceed with this, or do you want us to leave them alone?

CAPCOM Apollo 8, say again.

SC Do you want us to accept these, or should we leave them alone.

CAPCOM Standby.

SC Go ahead, Houston.

CAPCOM Roger, we do not wish you to accept those marks. This is due to the fact that in by passing the trunion bias check, you still have big numbers left in those registors, so you go ahead, when, after you do the trunion bias check, those numbers will become small later, but do not accept them right now.

SC Understand Houston.

CAPCOM We have a TLI plus 11 update for you when you are ready to copy.

SC Standby.

SC TLI plus 11.

CAPCOM Roger Bill, TLI plus 11, and this assumes no mid-course direction number 1. It's an SPS/G and N 63330 minus 163 plus 12 niner, are you with me so far?

SC Roger.

CAPCOM Okay, 01356475 niner minus 0048 niner, plus 00000 plus 47250177144000 not applicable plus 001 niner 747253554470501212782560 23 up 265 left 18, are you with me so far?

SC Roger.

CAPCOM Okay, plus 11 niner 7 minus 1650012681356080504653. GDC aline north, set stars, roll 068, pitch 0 niner 7, yaw 356, ullage none, other 1, fast return T37, Delta V equals 7 niner 00, for Indian Ocean. Number 2, high speed procedure not required. Number 3, assumes no mid-course directions number 1, over.

SC Roger, TLI plus 11, SPS/G and N 6330 minus 163 plus 12 niner 01356475 niner minus 0048 niner plus 0000 plus 47250, you copy so far?

CAPCOM Yes, I'm with you so far.

SC Roll.

CAPCOM Apollo 8, Houston. Affirmative, I'm with you.

SC Roll 17714400 NA plus 001 niner 747253554470501212782 6, section 256023, up 26 -

END OF TAPE

SC 023 up 265, left 18, copy so far?
CAPCOM Yes, I'm with you so far, Bill, go ahead.
SC Plus 1197, minus 16500 12681 35608 0506, correction 050 46 53 north set 068 097 356 0 ullage, note 1, fast return. B 37, DELTA-V 7900 Indian Ocean. 2. High speed procedure not required. 3. (garbled) tubes to MCC 1. Over.
CAPCOM That's all correct, Bill.
SC Roger.
SC Houston, Apollo 8.
CAPCOM Go ahead Apollo 8.
SC Roger Mike. I'd like to give some comments on B23 data. The auto maneuver was quite accurate Looks like we got some (garbled) in the maneuver. Auto optics put Canopus straight where it should be. A bit of in mode control worked as advertised. At the altitude at which I started to do the sighting they have a definite hazy band line. The filter gives the earth a glow, sort of an orange glow. It's very indefinite of where to put the star but there does seem to be a solid line where you might expect the horizon to be that appears through the haze, so we expect the atmosphere to be. I know the procedure which we had done up at MIT about 2 lines atop the haze layer a definite line for these (garbled). In regards to the optics calibration, it was very difficult to find a star in the landmark line-of-sight in the venting of the S-IVB.
CAPCOM Roger, Apollo 8. We copied that, and we'd like for you to do that trunion test, that calibration prior to your next set of sitings.
SC Roger, will do. Canopus just disappeared from view, and maybe when we get a little time here I'll try to get a calibration the first time.
CAPCOM Understand.
SC And Houston we've rewound the tape, you can dump it at your convenience.
CAPCOM Roger, Bill, thank you. Are you still picking up anything on the VHF?
SC Are you playing anything?
CAPCOM Affirmative.
SC No, I'm not picking anything up.
CAPCOM Roger, thank you.
SC What's our altitude now?
CAPCOM Well, you're about 20 000 miles.
SC Okay.
CAPCOM Give or take a thousand feet.
SC I'll go ahead and turn VHF off in the neck ring.

CAPCOM Roger, Bill, thank you.
SC It was some pretty nice music while it lasted.
CAPCOM Yes, I bet so.
CAPCOM Apollo 8, Houston.
SC Go ahead, Houston.
CAPCOM We're going to have to wait until we get the high gain antenna locked on again to dump the tpe.
SC And are you about ready for us to to the PPc attitude?
CAPCOM Standby one.
CAPCOM Apollo 8 Houston.
SC Go ahead.
CAPCOM We'd like to hold off on the PPC and get some more P23 information. We'll have some more details of that for you shortly.
SC Alright. Mike, what I'm doing now pointed over to the star Sirius (garbled)
CAPCOM Apollo 8 Houston. You faded out completely, Jim. I heard Frank but it faded when you began talking. Say again.
SC Roger. I have switched to Sirius, the second star in the first set to see if I can't get an optics calibration on it at least.
CAPCOM Roger. That's fine. We'll have some more good words for you shortly.
CAPCOM Apollo 8 Houston.
SC Go ahead.
CAPCOM Jim, on your P23, we'd like to go ahead and do the calibration and then use star number 15 and take three sets followed by star number 16, 2 sets. Over.
SC Roger, Houston, that's what we're trying to do. I'm trying to get 15 for an optics now. It's been very difficult with the bright earth to find a star that we can get into the sextant. I'm trying to use the auto optics on P23 to get the star. We have that now, we're trying to maneuver the spacecraft to bring the trunion to zero so we can get the lamp on line-of-sight.
CAPCOM Roger, understand. And I also have your PPC attitude, which is different than you have. I'll give that to you whenever you get a free moment.
SC Ready to copy.
CAPCOM Alright, PPC attitude will be Pitch, 242, yaw is 020. Over.
SC Pitch, 242, yaw 020, copy.
CAPCOM Very good, thank you.
SC Houston, Apollo 8, over.
CAPCOM Apollo 8 Houston, go ahead.

SC Okay, we'll hold up on the high gain check until we get out of peak.

CAPCOM Roger, Bill, thank you.

CAPCOM You may have to enjoy your lunch a little bit. Are you hungrey?

CAPCOM First time I ever heard you say that.

PAO This is Apollo Control Houston, 5 hours 52 minutes into the flight. You undoubtedly heard Frank Borman say that they would delay temporarily the checkout of the high gain antenna. And that - we just got an estimate from the crew on the distance of the S-IVB. Frank Borman estimates 50 miles, about 50 miles away. And then he corrected it and said in view of the international aspects of this flight let's make it 80 kilometers. Meanwhile, Lovell is checking his navigational programs and assuring that he can see the - making sure that his optics are operating properly. At 5 hours - the high gain antenna, by the way, is of course of considerable interest to many of our data transmission including the transmission of televised data. So it was programmed to be checked out at 5 hours and 40 minutes into the flight. It will be delayed slightly, perhaps 15 or 20 minutes. This is Apollo Control Houston.

END OF TAPE

PAO This is Apollo Control Houston at 6 hours 08 minutes into the flight. We've pretty settled here in the Control Center on the first midcourse correction which is presently planned as an SPS burn. Purposely wanted to get some early indication of its performance, the service propulsion system, and fortunately, the other events seemed to have worked in their favor. We are presently planning an SPS burn of 2 to 3 seconds duration. We will be putting 24 feet per second into the overall velocity. This event is presently scheduled to occur at about 9 hours into the flight. Beyond that, we still have no other indication of - we don't know any better just when the high gain antenna checkout will be made, but it should be done shortly. We have some tape from the last few minutes. We will play it for you now.

SC Okay, Houston. We did an optics calibration, we get zeros all the time.

CAPCOM Roger. Understand optics calibration and zeros all the time. Good.

SC It takes a lot longer to do it though. ' had to go to a star like Sirius to finally see it.

CAPCOM Roger, understand. We are real glad you got that so we can get a horizon calibration to put in the computer.

SC Looks like the number 5 window is starting to fog up, Houston.

CAPCOM Roger. Understand it's the number 5 is fogging up.

SC Houston, P-23 coming through Sirius.

CAPCOM Roger, thank you.

SC - a little better. These numbers are a little better.

CAPCOM We would expect so.

SC Houston, how do you read, Apollo 8.

CAPCOM Houston, go ahead.

SC Roger. A downlink on the P-23?

CAPCOM That is affirmative.

SC Okay. Now how much longer do you want us to hold our - to PTC?

CAPCOM I also have your PTC attitude, which is different than you have. I'll give that to you whenever you get a free moment.

CAPCOM Stand by one, Frank.

CAPCOM Apollo 8, Houston.

CAPCOM Apollo 8, this is Houston, over.

SC Roger. Are you recording all these ata from 23 or do you want some read down to you?

END OF TAPE

CAPCOM Stand by, Jim. We think we are getting it all. We are confirming now. That is affirmative, Jim. We are getting all that is coming down. How is it going?

SC It's working very nicely. I finished - one set was Sirius with three stars and one set with Procyon or two sightings, three sights with Sirius and two with Procyon.

END OF TAPE

PAO This is Apollo Control Houston. At 6 hours 29 minutes into the flight. At the present time, here in Mission Control Center, we are in the process of changing shifts. Flight Director Milton Windler, and his Maroon Team of flight controllers coming on to relieve Flight Director Clifford Charlesworth and the Green Team We have had some brief conversations with the Apollo 8 crew. Primarily concerning the onboard navigation exercises that they are involved in at the present time. The crew attempting to sight on two stars, Sirius and Canopus and take sightings on - angular sightings between the stars and the horizon. Conversations also concerned putting the spacecraft into passive thermal control mode and we expect shortly to begin test on the high-gain antenna. We will play back the tapes that we recorded of the conversations with the spacecraft and then pick up with whatever conversation is going at the time.

SC Go ahead Houston. Apollo 8.

CAP COM Roger Frank. What we are doing down here is this. We'd really like the horizon calibration. We would like to go to a 15 mark, you know, three sets on one star, two on the other. On the other hand, we are balancing that with the need to go to PPC and we are not losing sight of the fact that you want to go to PPC right away. So if you will bear with us another couple of minutes, we are trying to decide whether to actually go back and do some more of ... or whether to clear you at this time to go to PPC. Over.

SC Okay, we started maneuvering to PPC. We are getting kind of far behind and what I am concerned about Mike, Jim is now taking off his pressure suit.

CAP COM Roger. Understand. How about you and Bill?

SC Well, we are standing by till he gets through.

CAP COM Understand. And you are maneuvering to PPC. That's fine.

SC Well, I would prefer to do that, but we will ---

CAP COM Okay. Stand by just one.

CAP COM Apollo 8. Houston.

SC Go ahead Houston. Apollo 8.

CAP COM Roger. We would like to hold off on the passive thermal control until 7 hours GET and in the meantime to get as many more P23 marks as we can starting with the first star. And doing two sets of three marks each.

CAP COM And then going to the second set we gave you and concurrent with that. If possible, we would like Bill to run this high-gain antenna checkout as well as attitude. It's compatible with those.

SC They have not been to date. We are almost to the passive thermal control attitude now. And Jim is just half way through taking his suit off.

CAP COM Roger. Understand.

SC Let's hold off here for a minute.

CAP COM Roger. Frank. And the reason for this is the horizon calibration requires a number of points to give you and data for the onboard nav coming on.

SC Roger, we understand. We will be right back with you. Just wait a minute, here.

CAP COM Roger. Thank you.

SC That failing to separate from the S-IVB kind of fouled us up a little.

CAP COM Understand.

SC Houston. Apollo 8. How do you read?

CAP COM Apollo 8. Go ahead.

SC Roger. We are standing by. Are you about ready for the high-gain antenna trial?

CAP COM Okay. Just a second we will check on that. Are you in a position to where you can go back to the star sightings?

SC Well, we will be, but we can't until Jim gets AP COM Okay, we will stand will you give us a mark on that. In just a second I will check on the antenna. Okay, it looks like we are ready to go on the high-gain antenna check. And we can either go with commands called out from the ground and you can monitor it or you can be talked through. Which ever you prefer.

SC Well, stand by. I guess we are not quite in a proper attitude yet.

CAP COM Roger.

SC We are slowly getting it.

SC Houston. Apollo 8.

SC Houston. Apollo 8.

CAP COM Apollo 8. Houston. Did you call?

SC High-gain antenna on wide auto.

CAP COM Roger.

PAO This is Apollo Control. At the present time the spacecraft is nearing 30,000 miles altitude. The displays here in Mission Control Center show our current altitude at about 29,228 nautical miles. This is Apollo Control at 6 hours 35 minutes into the flight.

END OF TAPE

PAO This is Apollo Control Houston at 7 hours 11minutes now into the flight. During the change of shift press conference we had a very quiet period relatively quiet period here in Mission Control Center. Astronaut Tom Mattingly now acting as capsule Communicator and we had some communication with the Apollo 8 crew primarily concerning some minor modifications to their flight plan to get them back on the flight - back on the flight plan. Frank Borman also reported that the S-IVB appeared to be tumbling. That observation was confirmed from the ground and we appear to be getting good data from the high gain antenna. At least preliminary indications are that it is working as planned. The crew is scheduled to come up shortly on an eat period. They will be getting their first meal of the mission in space. And they also, prior to that time, plan to get completely out of their suits. We have some tape of the conversation. We'll play that back for you now.

SC Houston, Apollo 8.

CAP COM Go ahead Apollo 8.

SC Are you getting input from our high gain antenna?

CAP COM Apollo 8, Houston. Affirmative we are getting your data and we may have a beam width change but stand by on that.

SC All right we're standing by. Jim's about ready to go back to the P23.

CAP COM Roger. We have a GO until 7 hours on the start of the PPC.

CAP COM Roger, seven.

SC Houston, Apollo 8.

CAP COM Go ahead Apollo 8.

SC We're on the PPC mode waiting for Jim and I noticed that out my window now I can see Iran very clearly even though the sun is bright in the other window.

CAP COM Roger.

SC I didn't mean to say that but its true.

CAP COM Rog.

SC The number 5 window is getting pretty well obscurred and the number 3 window is unuseable.

CAP COM Roger, understand, number 3 is unuseable and number 5 is obscurred. Can you make out any definition at all or do you have a target to look at?

SC Well I can see the sun. Wait til it comes around the earth and I'll give you a better hack on that.

CAP COM Okay.

CAP COM Apollo 8, Houston. We're going to go ahead and try to dump your tape right now. Circuit

CAP COM margins aren't too good at our present configuration. We're going to take a look at it. If it doesn't work we may have to do something again later - configuration.

SC Roger.

SC Houston, Apollo 8. We're maneuvering back to do another P23.

CAP COM Roger, thank you.

SC Houston this is Apollo 8. I'll do two more sets on 15 and then we'll do 1 set on -

CAP COM Roger.

CAP COM Apollo 8, Houston.

SC Go ahead Houston, Apollo 8.

CAP COM Okay Apollo 8. I'd like to fill you in on things we're thinking about doing in the next couple of hours, first chance you get there.

SC Go ahead.

CAP COM Okay in relationship to the midcourse correction we'd like to put that one off until about 11 hours and it will be approximately a 25 foot per second burn. The reason we're delaying the burn time is to allow for better tracking as a result of the seven and one half foot per second you put in on the separation. We'd like to take a little more time to look at the tracking data. And the dispersions in your correction arc are going to be growing pretty fast here. What we'll do then is to delete the map sightings that occur about 9.10 in the flight plan and this will be getting us back on to the normal flight plan sequence. So we'll go ahead and finish the P23 and the 7 hour limit on that P23 is due to the range limits on this test. Over.

SC Is due to the what did you say?

CAP COM The 7 hours on the P23 problem is due to the fact that we want to get these sightings into the minimum range. Over.

SC Roger, Understand.

CAP COM If you have any comments on that proposal, why go ahead and pass them down, and we'll feed them in.

SC No I think that's fine. We need to get out of the suits and get something to eat here too.

CAP COM Roger. Looks like we'll be back on the flight plan by 11 hours. We'll be holding up on the updates and pads because of the later burn.

SC Houston, Apollo 8.

CAP COM Go ahead Apollo 8.

SC Hi Cap, I believe we - the SIV-B in flight it's -- would appear to be tumbling and every once in a while are getting very bright reflections from it off - the star off the front.

CAP COM Is that right?
SC Houston, APOLLO 8, are you getting the data from the P-23?
CAP COM Stand by one.
CAPCOM Affirmative, Apollo 8.
SC Okay.
CAPCOM Apollo 8, Houston.
SC Roger.
CAP COM Roger. We're copying your P-23 progress. AND FAO advises that it looks like you are finishing your first star and we'll need one more set on the second star, and this 7-hour cutoff isn't affirmed, so we would like for you to go ahead and complete the second star if you can.
SC We're on the last setting of the second star right now.
CAP COM Okay. Real fine. And we've got a - it's about time for a cryo fan cycle.
SC Okay. We'll do them one at the time for about 4 minutes on each of them.
CAP COM All right.
SC We've got the cryo fan on in H2 tank number 1.
CAP COM Roger.
SC Houston, Apollo 8. We've just got finished taking two sets six sightings on Sirius and one set on Procyon.
CAP COM Roger. I understand that's six on Sirius and one on Procyon.
SC Two sets.
CAP COM Roger.
SC And we're maneuvering now the PTC attitude.
CAP COM Oh roger, we follow you.
CAP COM And Apollo 8, when you get a chance down in the lower equipment bay it looks like you're using the flood lights in the dim 2 position. And that one is a time limited item. We would like for you to do your standard running in the dim 1 position. Over.
SC Roger. Just turned them off.
CAP COM Okay. Anytime you have one running dim 1 position, prefer them to the LAB.
SC Thank you.
SC Houston. We have the cryo fan on the number 1 H2 tank was on 0 sub 01. You can give us the enact when you want it - when you're ready for it to be turned off.
CAP COM Wilco.
CAP COM Okay, Apollo 8, you can terminate that one and go to the other pact.
SC Roger. Okay, H2 number 2 is on.
CAP COM Roger.
SC Houston, Apollo 8.

CAP COM — Go ahead.

SC — Are you having any problem on the ground with your comm?

SC — Negative. You're coming in loud and clear.

SC — Okay. We seem to be breaking lock intermittently up here.

CAPCOM — All right, we'll keep our eye on it. It sounds good though.

SC — Okay, Houston, Apollo 8. We've initiated the PTC.

CAPCOM — Roger.

END OF TAPE

SC Okay, Houston, Apollo 8. We initiated a PTC.

CAPCOM Roger. Okay Apollo 8, you can terminate the fans and the hydrogen and we're ready to start on the oxygen tanks.

SC Okay.

CAPCOM Apollo 8, we are through with the dump, you can have the tape recorder back.

SC Roger, thanks.

CAPCOM Apollo 8, Houston, we are ready to go to the second 02 tank.

SC Okay.

CAPCOM And for your information, it's Cleveland 24 to 10, and know what we plan to do?

SC Say again.

CAPCOM That's Cleveland 24 to 10, not over yet.

SC Thank you.

CAPCOM Okay Apollo 8. Looks like you can terminate your cryo fans now. And we're going to leave you alone for a while and let you get caught up. Things we have onboard, the high gain antenna check-comm mode check- that you have listed at 7 hours we'll put off and do whenever you are ready for it. So that's at your convenience. During the high gain DELTA we've performed using a wide band we were still getting real good data at 36K, which is little bit further than circuit margins that were predicted for it, and we've got our SPS burn coming up somewhere about 11 hours. and we'll give you more information on that later.

SC Roger. Right night we're on the program 21 now determining ground track for LOI it was that we did not make in 5 hours.

CAPCOM Alright, thank you.

FAO During that conversation with the crew you heard Frank Borman refer to the windows on the spacecraft clouding up. He mentioned that the number 3 window was completely clouded over and that the number 5 window was partially clouded. Those windows, as seen from the inside of the spacecraft, number from 1 to 5 beginning with the commander's side window, left hand side of the commander's couch. Number 2 window would be the docking window above the commander's position. The number 3 window is the hatch window, and number 4 would be the docking above the Command Module, or rather Lunar Module pilot, and number 5 would be the Lunar Module pilot's right hand window. You also heard some references there to P23. Now this refers to a computer program and indicates that the crew is involved - or refers rather to onboard navigation activities. We've had no other conversation with the crew and we anticipate they will be involved in eating shortly. This is Apollo Control at 7 hours 25 minutes.

END OF TAPE

SC Houston, Apollo 8.
CAPCOM Go ahead, Apollo 8.
SC Omni B.
CAPCOM Roger, omni B. Apollo 8, is that Bravo or Delta?
SC Dog.
CAPCOM Roger.
SC Program 21 to integrate up to LOI just stalled out around 69 hours and 02 minutes.
CAPCOM Roger, they are watching it.
SC Houston, Apollo 8.
CAPCOM Go ahead, Apollo 8.
SC Roger. Do you want us to stop the integration via VERB 96, over.
CAPCOM That is affirmative, VERB 96.
SC Roger, will do.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 74900, 44/1

PAO This is Apollo Control at 7 hours 49 minutes into the flight. We have a very quiet period since our last announcement. The crew scheduled to conduct their first midcourse correction at about 11 hours into the mission. This had originally been scheduled for 9 hours and we slipped it for about 2 hours to offer some additional tracking on the spacecraft prior to the burn. At present time, Apollo 8 is at an altitude of about 36,000 nautical miles and as our altitude continues to climb, the velocity continues to decrease. The speed at present time is about 10,000 feet per second. That would translate to about 6800 miles per hour. This is Apollo Control and 7 hours 50 minutes.

END OF TAPE

PAO This is Apollo Control at 8 hours 01 minute into the flight. The crew has been involved in some housekeeping chores aboard the spacecraft. Changing out the lithium hydroxide canister and we had a brief conversation with them during which the ground passed up the score of the - fourth quarter score of the Cleveland-Dallas game and we will play back that conversation now and stand by for any further comments from the spacecraft.

SC Houston, this is Apollo 8.

CAPCOM Apollo 8, Houston. Go ahead, Apollo 8.

SC 52 realignment also?

CAPCOM Yes, that is affirmative, CAPCOM. We want to do that a couple of hours when it is related to the manuever, midcourse.

CAPCOM That is affirmative, Apollo 8. Let's try to maneuver and we will hold off and do that all in normal premaneuver sequence. And we have got a score here in the fourth quarter 31 to 13. And I've got some words on your P-21 discrepancy any time you are interested. And I'd like to confirm - Before I get off on that one, I'd like to confirm that you use the VERB 37 procedure to go to POO.

SC Roger.

CAPCOM Okay, on P-21, we making runs at - you had a slight error in your state vector at the time you started and when that was integrated out, it intercepted the lunar surface where it locked up and this is contained in a fairly recent program node.

SC Okay. Now, we've closed waste vent, so we should the this 02 come down now.

CAPCOM Okay, understand you closed the waste vent and how about the lithium change? Have you done that one?

SC Roger, that's done.

CAPCOM Okay, thank you. T-comm flight, did you copy that?

TECH COMM This communication is great. We won't have to have debriefing.

CAPCOM That's pretty outstanding. Did you copy that?

PAO This is Apollo Control. At the present time, the spacecraft altitude is 37,749 nautical miles and our velocity down to 9800 feet per second. We don't hear any more conversation from the crew. We will stand by to pick up again should any communication develop between the ground and the spacecraft. This is Apollo Control at 8 hours 04 minutes.

END OF TAPE